

# PATENT SPECIFICATION

NO DRAWINGS

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## COMPLETE SPECIFICATION

### Detergent Tablet

We, UNILEVER LIMITED, a Company registered under the laws of Great Britain, of Port Sunlight, in the County of Chester, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to detergent compositions and more particularly to detergent compositions in the form of tablets, pellets, blocks or briquettes, hereinafter referred to generally as tablets.

Such tablets intended for washing fabrics, particularly in washing machines, are commonly made by compressing particles in a tableting machine into a generally cylindrical tablet of 30 to 75 mm. diameter and 10 to 35 mm. thickness weighing 25 to 65 gm. A typical composition for such a tablet is given in Table I

TABLE I

Component	Amount (%, by weight)
Sodium tripolyphosphate	44.8
Biologically soft sodium alkyl benzene sulphonate	17.05
Sodium toluene sulphonate	2.28
Coconut monoethanolamide	4.26
Optical whitener	0.12
Alkaline sodium silicate solids	8.5
Water	5.91
Sodium perborate	8.5
Sodium carboxymethylcellulose	1.08
Sodium sulphate, sodium chloride and non-detergent oily matter	5.22
Talc.	2.28
Weight of tablet:	44.0 gm.

A tablet can be made from a powder of a composition such as that given in Table 1 by placing a measured quantity of such powder in a die box made of any suitable material. The powder in the die box is then compressed by dies to between two-thirds and two-fifths of its original volume, the pressure of the dies is released and the tablet is removed from the die box.

It is desirable that such tablets should not be too hard, causing them to take an unduly long time to dissolve in a washing machine, nor yet too friable, causing them to crumble during packaging and handling after tableting. A convenient measure of the strength of such a tablet is given by the following test.

#### TEST

A tablet is placed on edge on the pan of a spring balance. A lever applies a gradually-increasing load to the top of the tablet. The highest reading given by the pointer of the balance before the tablet crumbles is taken as a measure of the strength of the tablet.

A tablet of the composition given in Table I which was found in practice to be satisfactory as regards its disintegration in use and ability to withstand handling has a strength of about 7.5 Kg. measured by the above test.

Two sets of tablets of the composition given in Table 2 were made to strengths, measured within one hour of stamping by the above test, of 5.4 Kg. and 7.5 Kg. When, after storage for some days they were placed in water at 50°C. and agitated in a washing machine of the type having an oscillating paddle in the bottom of the tub they took more than two minutes to dissolve. This is considered to be unduly long.

TABLE 2

	Component	Amount (% by weight)
	Sodium tripolyphosphate	5.65
5	Trisodium nitrilotriacetate	32.0
	Biologically soft sodium dodecyl benzene sulphonate	19.2
	Sodium toluene sulphonate	2.56
	Coconut monoethanolamide	4.8
10	Optical whitener	0.14
	Alkaline sodium silicate solids	9.6
	Water	6.7
	Sodium perborate	9.6
	Sodium carboxymethylcellulose	1.22
15	Sodium sulphate, sodium chloride and non-detergent oily matter	5.97
	Talc.	2.56
	Weight of tablet: 39.0 gm.	

20 It can be seen that the difference between the composition of Table 1 and that of Table 2 is that most of the sodium tripolyphosphate has been replaced by an equivalent quantity of the trisodium salt of nitrilotriacetic acid.

25 It was found that when tablets of the composition given in Table 2 were made to a strength, as measured by the above test within 1 hour of stamping, of 2.7 Kg. they were sufficiently strong to withstand the operation of packaging. It was further found that these  
30 tablets, made to an initial strength of 2.7 Kg. had hardened after storage for a week to a strength of about 8.2 Kg., and could be dropped from a height of four or five feet onto a concrete floor without breaking. The  
35 tablets of composition 2, when they had

hardened to a strength of 8.2 Kg. were more resilient and resistant to fracture than tablets of composition 1 of similar strength. Despite this increase in strength, these tablets disintegrated in a washing machine of the type described above within a period of two minutes. The strength of the tablets did not go on increasing indefinitely. After nine weeks a tablet of 1.8 Kg. initial strength and composition as in Table 2 had a strength of 8.2 Kg. and disintegrated in a washing machine in 1½ minutes.

The present invention provides a process for the manufacture of a detergent tablet containing from 15% to 45% by weight of the tablet of trisodium nitrilotriacetate, the balance of the tablet consisting of detergent, builders and adjuncts selected from those suitable for use in detergent tablets, which process includes the step of pressing the tablet to a fracture strength as measured within 1 hour of stamping of from 0.9 to 4.5 Kg., preferably from 1.8 Kg. to 3.6 Kg.

A further aspect of the invention is a detergent tablet containing from 15% to 45% by weight of the tablet of trisodium nitrilotriacetate, the balance of the tablet consisting of detergent, builders and adjuncts selected from those suitable for use in detergent tablets, which tablet has a fracture strength of from 7.0 Kg. to 9.0 Kg., preferably about 8.2 Kg. after at least one week of ageing.

The invention is illustrated by the following Example in which the effect of different builders on the strength of Washing Machine Tablets is compared.

## EXAMPLE

## Compositions of Tablets

	A	B	C	D
	wt. %	wt. %	wt. %	wt. %
75	6.25	6.25	31.05	6.25
	—	—	—	24.8
	24.8	—	—	—
	—	24.8	—	—
80	21.3	21.3	21.3	21.3
	2.83	2.83	2.83	2.83
	5.32	5.32	5.32	5.32
	0.15	0.15	0.15	0.15
85	10.65	10.65	10.65	10.65
	7.35	7.35	7.35	7.35
	10.65	10.65	10.65	10.65
	1.35	1.35	1.35	1.35
90	6.52	6.52	6.52	6.52
	2.83	2.83	2.83	2.83
	100	100	100	100

95 Weight of tablets: 27 gm.

## Fracture Strength of Tablets

			As made	After 2 days	After 7 days
			Kg.	Kg.	Kg.
5	A	weak	2.7	2.7	2.7
		strong	5.5	5.7	6.1
	B	weak	3.0	2.7	2.7
		strong	5.5	5.0	6.3
10	C	weak	2.7	2.3	2.3
		strong	5.9	5.5	5.9
	D	weak	2.7	3.6	8.2
		strong	6.4	8.6	10.9

It will be seen that the fracture strength of tablet D increases after pressing whereas the fracture strength of the other tablets remains substantially unchanged after pressing. Tablet D is the only tablet containing trisodium nitrilotriacetate.

## WHAT WE CLAIM IS:—

1. A process for the preparation of a detergent tablet from a particulate detergent composition containing 15 to 45% by weight of trisodium nitrilotriacetate in which the tablet is formed by compressing the detergent composition to an initial fracture strength, as measured within one hour of compression, of 0.9 to 4.5 kg. and is then aged for at least one week whereby the tablet is obtained with a fracture strength of 7 to 9 kg.

2. A process according to Claim 1, in which the initial fracture strength as measured

within one hour of compression is from 1.8 to 3.6 kg.

3. A process according to Claim 1, in which the initial fracture strength as measured within one hour of stamping is 2.7 kg.

4. A process for the manufacture of a detergent tablet containing from 15% to 45% by weight of trisodium nitrilotriacetate and having a fracture strength after being aged for at least one week of 7 to 9 kg. substantially as described hereinbefore with particular reference to the Example.

5. A detergent tablet containing from 15% to 45% by weight of trisodium nitrilotriacetate and a fracture strength of from 7 kg. to 9 kg. after at least one week of ageing.

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